ATLAS OF ZEOLITE STRUCTURE TYPES

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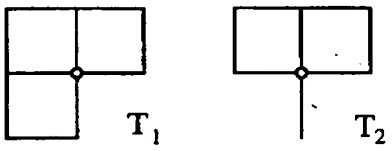
ERI ERIONITE $P6_3/mmc$

Framework density: 15.6 T/1000 Å^3

Loop configuration of T-atoms:



Coordination sequences:
T_1(24) 4 9 17 30 50 75 98 118 144 185
T_2(12) 4 10 20 32 46 64 90 126 164 196

Channels: ⊥ [001] **8** 3.6 x 5.1***

Type material: **Erionite** $(Na_2,Ca..)_{3.5}K_2[Al_9Si_{27}O_{72}] \cdot 27\ H_2O$
hexagonal, $P6_3/mmc$, a=13.3, c=15.1 Å[1-3]

Framework description: AABAAC sequence of 6-rings

Isotypic framework structures: $AlPO_4$-17 plus numerous compositional variants[4,5]
LZ-220[6]
Linde T (ERI-OFF structural intermediate)[7]

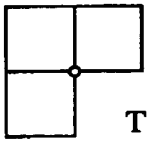
References:

(1) L. W. Staples and J. A. Gard, Mineral. Mag. 32, 261 (1959).
(2) A. Kawahara and H. Curien, Bull. Soc. Fr. Mineral. Crystallogr. 92, 250 (1969).
(3) J. A. Gard and J. M. Tait, Proc. 3rd IZC, Recent Progress Reports (Leuven UP, 1973), p 94.
(4) J. J. Pluth, J. V. Smith and J. M. Bennett, Acta Cryst. C42, 283 (1986).
(5) See AEL ref. 2.
(6) D. W. Breck and G. W. Skeels, US Patent 4,503,023 (1985).
(7) D. W. Breck, Zeolite Molecular Sieves (Wiley, 1974), p 173.

FAU FAUJASITE $Fd\bar{3}m$

Framework density: 12.7 T/1000 Å^3

Loop configuration of T-atoms:



Coordination sequences: T(192) 4 9 16 25 37 53 73 96 120 145

Channels: <111> **12** 7.4***

Type material: **Faujasite** $(Na_2,Ca,Mg)_{29}[Al_{58}Si_{134}O_{384}] \cdot 240\ H_2O$
cubic, $Fd\bar{3}m$, a=24.7 Å[1,2]

Isotypic framework structures:
Beryllophosphate X[3]
CSZ-1 (EMT-FAU structural intermediate)[4]
ECR-30 (EMT-FAU structural intermediate)[5]
Linde X[6,7]
Linde Y[8,9]
LZ-210[10]
SAPO-37[11]
Zincophosphate X[3]
ZSM-20 (EMT-FAU structural intermediate)[12]
ZSM-3 (EMT-FAU structural intermediate)[13]
and numerous other compositional variants

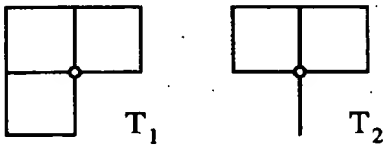
References:

(1) G. Bergerhoff, W. H. Baur and W. Nowacki, N. Jb. Miner. Mh. **1958**, 193 (1958)
(2) W. H. Baur, Am. Mineral. **49**, 697 (1964)
(3) T. E. Gier and G. D. Stucky, Zeolites **12**, 770 (1992).
(4) M. G. Barrett and D. E. W. Vaughan, UK Patent GB 2,076, 793 A (1981).

LTL LINDE TYPE L P6/mmm

Framework density: 16.4 T/1000 Å^3

Loop configuration of T-atoms:



Coordination sequences:

T_1(24) 4 9 17 29 46 69 98 131 162 187

T_2(12) 4 10 21 35 49 66 89 117 150 190

Channels: [001] **12** 7.1*

Type material: **Linde Type L** $K_6Na_3[Al_9Si_{27}O_{72}] \cdot 21\ H_2O$
hexagonal, P6/mmm, a=18.4, c=7.5 Å[1]

Isotypic framework structures:
Gallosilicate L[2,3]
(K,Ba)-G,L[4]
LZ-212[5]
Perlialite[6,7]

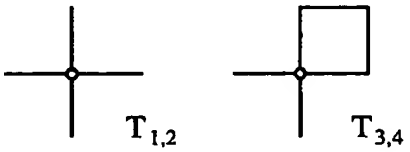
References:

(1) R. M. Barrer and H. Villiger, Z. Kristallogr. **128**, 352 (1969).
(2) P. A. Wright, J. M. Thomas, A. K. Cheetham, A. K. Nowak, Nature **318**, 611 (1985).
(3) J. M. Newsam, Mater. Res. Bull. **21**, 661 (1986).
(4) C. Baerlocher and R.M. Barrer, Z. Kristallogr. **136**, 245 (1972).
(5) D. W. Breck and G. W. Skeels, US Patent 4,503,023 (1985).
(6) G. Artioli and A. Kvick, Eur. J. Mineral. **2**, 749 (1990).
(7) Y. P. Menshikov, Zap. Vses. Mineral. O-va. **113**, 607 (1984).

MOR MORDENITE Cmcm

Framework density: 17.2 T/1000 Å^3

Loop configuration of T-atoms:



Coordination sequences:

T_1(16) 4 12 22 38 60 88 115 155 204 242
T_2(16) 4 12 20 37 64 87 114 154 198 241
T_3 (8) 4 11 24 39 54 86 126 156 195 242
T_4 (8) 4 11 24 39 60 92 122 148 195 250

Channels: [001] **12** 6.5 x 7.0* ↔ [010] **8** 2.6 x 5.7*

Type material: **Mordenite** $Na_8[Al_8Si_{40}O_{96}] \cdot 24\ H_2O$
orthorhombic, Cmcm, a=18.1, b=20.5, c=7.5 Å[1]

Isotypic framework structures:

Ca-Q[2]
Gallosilicate MOR[3]
Large port mordenite[4]
LZ-211[5]
Maricopaite (interrupted framework)[6]
Na-D[7]
Zeolon

Alternate designations:

Ptilolite
Arduinite (discredited)
Flokite (discredited)

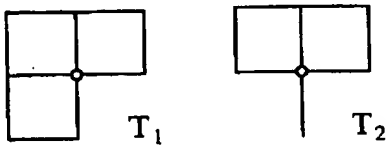
References:

(1) W. M. Meier, Z. Kristallogr. **115**, 439 (1961).
(2) M. Koizumi and R. Roy, J. Geol. **68**, 41 (1960).
(3) M.J. Eapen, K.S.N. Reddy, P.N. Joshi and V.P. Shiralkar, J. Incl. Phen. Mol. Recogn. Chem. **14**, 119 (1992).
(4) L. B. Sand, Molecular Sieves, Soc. of Chem. Industry, London, p. 71 (1968).
(5) D. W. Breck and G. W. Skeels, US Patent 4,503,023 (1985).
(6) R. Rouse and D. R. Peacor, Am. Mineral. **79**, 175 (1994).
(7) R. M. Barrer and E. A. D. White, J. Chem. Soc. **1952**, 1561 (1952).

OFF — OFFRETITE — $P\bar{6}m2$

Framework density: 15.5 T/1000 Å^3

Loop configuration of T-atoms:



Coordination sequences:

T_1(12) 4 9 17 30 50 75 98 118 144 185
T_2(6) 4 10 20 32 46 66 94 128 162 192

Channels: [001] **12** 6.7* ↔ ⊥ [001] **8** 3.6 x 4.9**

Type material: **Offretite** $(Ca,Mg)_{1.5}K[Al_4Si_{14}O_{36}] \cdot 14\,H_2O$
hexagonal, $P\bar{6}m2$, a=13.3, c=7.6 Å[1,2]

Framework description: AAB sequence of 6-rings

Isotypic framework structures: Linde T (ERI-OFF structural intermediate)[3]
LZ-217[4]
TMA-O[5]

References:

(1) J. M. Bennett and J. A. Gard, Nature **214**, 1005 (1967).
(2) J. A. Gard and J. M. Tait, Acta Cryst. **B28**, 825 (1972).
(3) D. W. Breck, Zeolite Molecular Sieves (Wiley, 1974) p. 103.
(4) D. W. Breck and G. W. Skeels, US Patent 4,503,023 (1985).
(5) R. Aiello, R. M. Barrer, J. A. Davies and I. S. Kerr, Trans. Farad. Soc. **66**, 1610 (1970).